

Potential Montana PM_{2.5} Non-Attainment Areas

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I. Introduction

The U.S. Environmental Protection Agency (EPA) recently revised the national ambient air quality standards (NAAQS) for particulate matter (PM). NAAQS are intended to protect public health and are established for six criteria air pollutants. The revisions affect the NAAQS for fine PM less than or equal to 2.5 microns (PM_{2.5}) in aerodynamic diameter and for particles less than or equal to 10 microns (PM₁₀). The revisions also affect the ambient air monitoring requirements for PM.

II. PM NAAQS & Related Rules Published in the Federal Register (FR)

11/1/05: PM_{2.5} Implementation rule proposed in 70 FR 65984
1/17/06: PM NAAQS Revisions proposed in 71 FR 2620
1/17/06: PM Monitoring Revisions proposed in 71 FR 2710
2/9/06: Transition to New or Revised PM NAAQS; advanced notice of proposed rulemaking in 71 FR 6718
3/10/06: Treatment of Data Influenced by Exceptional Events; proposed in 71 FR 12592
10/17/06: PM NAAQS final rule published in 71 FR 61144
10/17/06: PM Monitoring final rule published in 71 FR 61236
3/22/07: Treatment of Data Influenced by Exceptional Events; final rule published in 72 FR 13560
4/25/07: PM_{2.5} Implementation final rule published in 72 FR 20586
6/12/07: PM Monitoring Corrections; direct final rule published in 72 FR 32193

III. PM_{2.5} NAAQS Compliance Designation Timeline

10/17/06: PM NAAQS final rule published in FR
12/18/06: Effective date of the final PM NAAQS rule
12/18/07: Based on air monitoring data collected in 2004-2006, States' submit recommendations to EPA as to whether or not local communities are complying with the PM NAAQS.
12/18/08: EPA makes final PM compliance designations after reviewing most recent monitoring data and EPA may take one additional year to decide, up to 12/18/09.
4/27/10: Effective date for EPA's PM compliance designations
4/27/13: Deadline for States to submit PM State Implementation Plans (SIP) to 'clean up' the air in those communities designated as 'non-attainment'

IV. Related PM NAAQS Issues & Montana Studies

- EPA withdrew its proposal for a coarse PM_{10-2.5} standard
- EPA retained the 24-hr PM₁₀ standard to protect against the health effects associated with short-term exposure to coarse particles
- EPA revoked the annual PM₁₀ standard
- A Chemical Mass Balance (CMB) study identifying the PM_{2.5} air pollution sources was conducted in Libby during the winter of 2003-2004. The Libby CMB report was submitted on 11 January 2005
- CMB studies were conducted in Missoula and Hamilton during the winter of 2006-2007. The Hamilton CMB report was submitted in August 2007 and the Missoula report was submitted in November 2007.
- CMB studies are being conducted in Butte, Helena, and Belgrade during the winter of 2007-2008 with the reports due in the summer of 2008.

V. Montana PM Monitoring Data Review & Compliance Projections

Table 1 reviews the current and former PM NAAQS. Tables 2 and 3 summarize ambient PM_{2.5} data for short-term and annual time periods, respectively in various Montana communities. Table 4 lists the current PM₁₀ non-attainment areas (NAA). Table 5 projects potential NAA in Montana for short and long-term PM_{2.5} NAAQS.

Table 1. Current & Former Particulate Matter NAAQS (units are $\mu\text{g}/\text{m}^3$)

FORM	TSP (1971)	PM ₁₀ (1987)	PM ₁₀ (2006)	PM _{2.5} (1997)	PM _{2.5} (2006)
24-Hour	260	150 ^a	150 ^a	65 ^c	35 ^c
Annual	75	50 ^b	revoked	15 ^d	15 ^d

^a Expected 24-hr average exceedance from statistical calculations based on 3 years of data

^b Annual mean from statistical calculations based on 3 years of data

^c 3-year average of the 98th percentile values

^d 3-year average of the spatially averaged means

Table 2. PM_{2.5} Daily Data & Potential Non-Attainment Areas
(24-hr values are 98th percentile; units are $\mu\text{g}/\text{m}^3$)

Location	2004 ¹	2005 ¹	2006 ¹	Avg ²	2007 ³	Avg ⁴
Belgrade	25.2	36.3	25.7	29.1	28.1*	30.0
Billings	19.4	31.0	17.6	22.7	19.9*	22.8
Bozeman ⁶	nd	14.4	28.6	nd	23.2*	22.1
Butte	29.6	35.9	39.1	34.9	26.0	33.7
Great Falls	12.2	17.6	15.2	15.0	22.4*	18.4
Hamilton ⁵	44.7	40.7	27.8	37.7	27.8	32.1
Helena	32.9	38.1	24.7	31.9	25.8*	29.5
Kalispell	24.6	17.5	22.8	21.6	20.7*	20.3
Libby	37.7	51.1	40.5	43.1	32.2	41.3
Missoula	46.8	42.5	30.2	39.8	32.8*	35.2
Seeley Lake	22.6 ⁸	25.1 ⁸	38.3 ⁸	28.7 ⁸	29.5 ⁸	31.0 ⁸
Thompson Falls	18.3	15.1	25.5	19.6	18.4	19.7
Whitefish	23.3	22.0	26.2	23.8	22.2	23.5
W.Yellowstone – Alley ⁷	nd	nd	nd	nd	30.0	nd
YNP - West Entrance	17.6	8.4	10.6	12.2	16.8*	11.9

nd = no monitoring data

* = wildfire smoke affected data

¹ Excludes data $\geq 35 \mu\text{g}/\text{m}^3$ flagged & concurred by EPA as 'exceptional event', e.g. wildfire smoke

² Average based on the 3-yr period 2004-2006.

³ Excludes flagged data either $\geq 35 \mu\text{g}/\text{m}^3$ or contributing to a violation & likely to be concurred by EPA as 'exceptional event' (wildfires)

⁴ Average based on the 3-yr period 2005-2007.

⁵ Monitor moved in 2005 and the 2005 data from both sites was combined for an estimated 98th percentile value in 2005.

⁶ New site with very few samples collected in 2005; not enough data for valid 3-yr average.

⁷ FRM sampling started at this site in 2007.

⁸ Failed 75% data recovery requirement.

Red = currently demonstrating noncompliance with the 24-hour standard of $35 \mu\text{g}/\text{m}^3$.

Orange = potential for noncompliance, criteria is within 15% of the NAAQS

Table 3. PM_{2.5} Annual Means & Potential Non-Attainment Areas
(units are $\mu\text{g}/\text{m}^3$)

Location	2004 ¹	2005 ¹	2006 ¹	Avg. ²	2007 ³	Avg. ⁴
Belgrade	7.32	10.97 ⁹	9.58	9.29 ⁹	8.67	9.74 ⁹
Billings	8.16	9.02	8.92	8.70	7.96	8.63
Bozeman	nd	6.77 ^{7,9}	6.71	6.71 ⁷	6.24	6.48 ⁷
Butte ¹⁰	8.50	10.27	10.57	9.78	10.77	10.54
Great Falls	4.50	5.92	5.58	5.33	6.13	5.88
Hamilton ⁶	8.53	8.94	8.34	8.60	8.80	8.69
Helena	7.86	8.51	7.38	7.92	8.31	8.07
Kalispell	8.57	8.42	8.27	8.42	8.60	8.43
Libby ^{5,10}	14.02	15.81	15.16	15.00	13.05	14.67
Missoula ¹⁰	10.70	11.11	9.12	10.31	10.30	10.18
Seeley Lake	nd ^{7,9}	10.80 ⁹	10.34 ⁹	10.57 ⁷	13.00 ⁹	11.38 ⁹
Thompson Falls	6.46	6.24	7.34	6.68	7.00	6.86
Whitefish	9.97	9.73	9.77	9.82	9.46	9.65
W. Yellowstone-Alley ⁸	nd	nd	nd	nd	8.33	nd
YNP - West Entrance	4.68	3.67	4.26	4.20	5.09	4.24

nd = no monitoring data

* = includes data affected by wildfire smoke

¹ Excludes data $\geq 35 \mu\text{g}/\text{m}^3$ flagged & concurred by EPA as 'exceptional event', e.g. wildfire smoke

² Average of annual means based on the 3-yr periods of 2004-2006

³ Excludes flagged data either $\geq 35 \mu\text{g}/\text{m}^3$ or contributing to a violation & likely to be concurred by EPA as 'exceptional event' (wildfires)

⁴ Average of annual means based on the 3-yr periods of 2005-2007

⁵ Libby is currently designated as non-attainment for the 1997 PM_{2.5} annual standard

⁶ Monitor moved in 2005 and the 2005 data from both sites was combined for an estimated 2005 avg.

⁷ New site with very few samples collected in first year; not enough data for valid 3-yr average.

⁸ FRM sampling started at this site in 2007.

⁹ Failed 75% data recovery requirement, annual mean not valid.

¹⁰ Annual means were calculated as required by 40 CFR Part 50 Appendix N for only these sites.

Red = currently designated noncompliant with the annual standard of $15.0 \mu\text{g}/\text{m}^3$.

Orange = potential for noncompliance, criteria is within 15% of the NAAQS

Table 4. Current PM10 Non-Attainment Areas

Community	Whitefish	Butte	Thompson Falls	Kalispell	Libby	Missoula	Columbia Falls
Historic Max. Violation Value ¹ (24-hr avg in µg/m ³)	333	302	261	260	256	239	186

¹ The highest monitored value from the time period with violations of the 24-hour standard.

Table 5. Potential PM2.5 Non-Attainment Areas

Community	Based on 2004-2006 Data		Based on 2005-2007 Data	
	98 th Percentile ²	Annual Mean ³	98 th Percentile ²	Annual Mean ³
Libby ^{1,7}	43.1	15.00	41.3	14.67
Missoula ⁷	39.8	10.31	35.2	10.18
Butte ⁷	34.9	9.78	33.7	10.54
Hamilton	37.7	8.60	32.1	8.69
Seeley Lake	28.7	10.57 ⁴	31.0	11.38 ⁴
Belgrade	29.1	9.29 ⁴	30.0	9.74 ⁴
Helena	31.9	7.92	29.5	8.07
W. Yellowstone ⁵	nd	nd	30.0	8.33 ⁶

nd = no monitoring data

¹ Libby is currently designated as non-attainment under the 1997 PM2.5 annual standard.

² 3-Year average of 98th percentile values.

³ 3-Year average of annual means.

⁴ Data recovery rate < 75%, annual mean not valid.

⁵ FRM sampling started at this site in 2007.

⁶ Mean not valid < 3 years of data.

⁷ Annual means were calculated as required by 40 CFR Part 50 Appendix N for only these sites.

Red = currently demonstrating noncompliance

Orange = potential for noncompliance, criteria is within 15% of the NAAQS